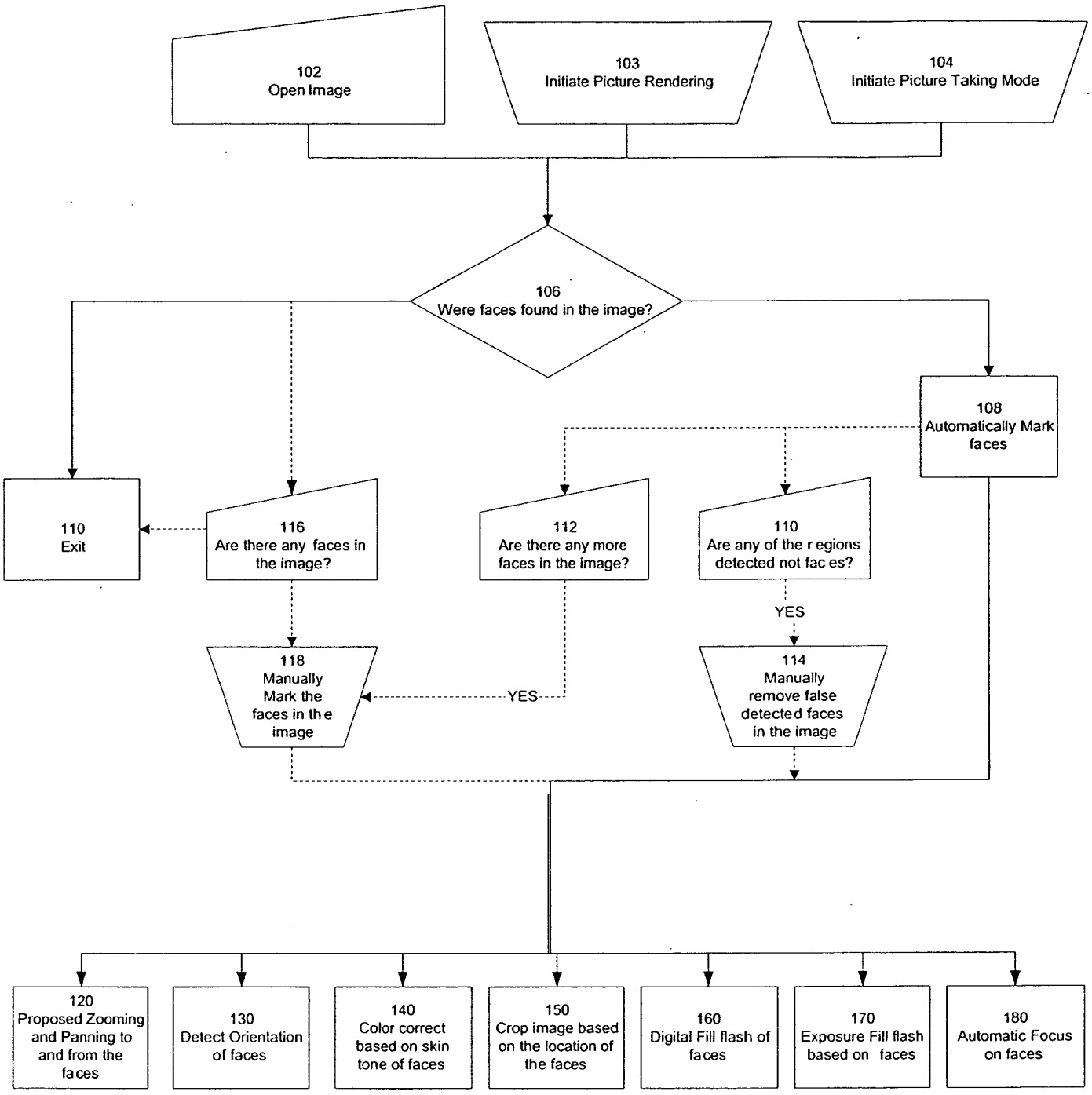

102
Open Image
103
Initiate Picture Rendering
104
Initiate Picture Taking Mode
106
Were faces found in the image?
108
Automatically Mark faces
110
Exit
116
Are there any faces in the image?
112
Are there any more faces in the image?
110
Are any of the regions detected not faces?
YES
118
Manually Mark the faces in the image
YES
114
Manually remove false detected faces in the image
120
Proposed Zooming and Panning to and from the faces
130
Detect Orientation of faces
140
Color correct based on skin tone of faces
150
Crop image based on the location of the faces
160
Digital Fill flash of faces
170
Exposure Fill flash based on faces
180
Automatic Focus on faces

Figure 1a

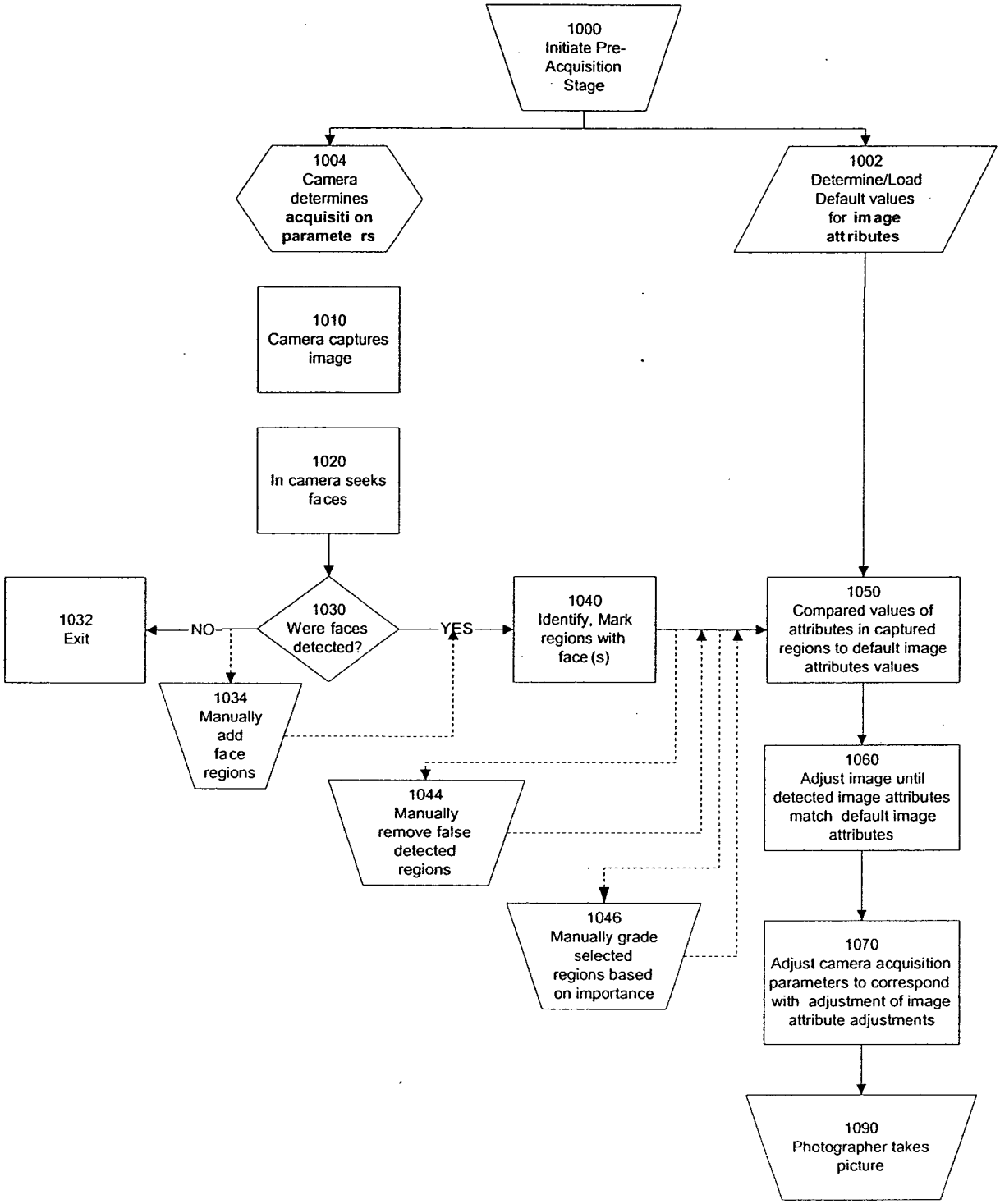

1000
Initiate Pre-Acquisition Stage
1004
Camera determines acquisiti on paramete rs
1002
Determine/Load Default values for image attributes
1010
Camera captures image
1020
In camera seeks faces
1030
Were faces detected?
NO
YES
1032
Exit
1034
Manually add face regions
1040
Identify, Mark regions with face(s)
1044
Manually remove false detected regions
1046
Manually grade selected regions based on importance
1050
Compared values of attributes in captured regions to default image attributes values
1060
Adjust image until detected image attributes match default image attributes
1070
Adjust camera acquisition parameters to correspond with adjustment of image attribute adjustments
1090
Photographer takes picture

Figure 1b

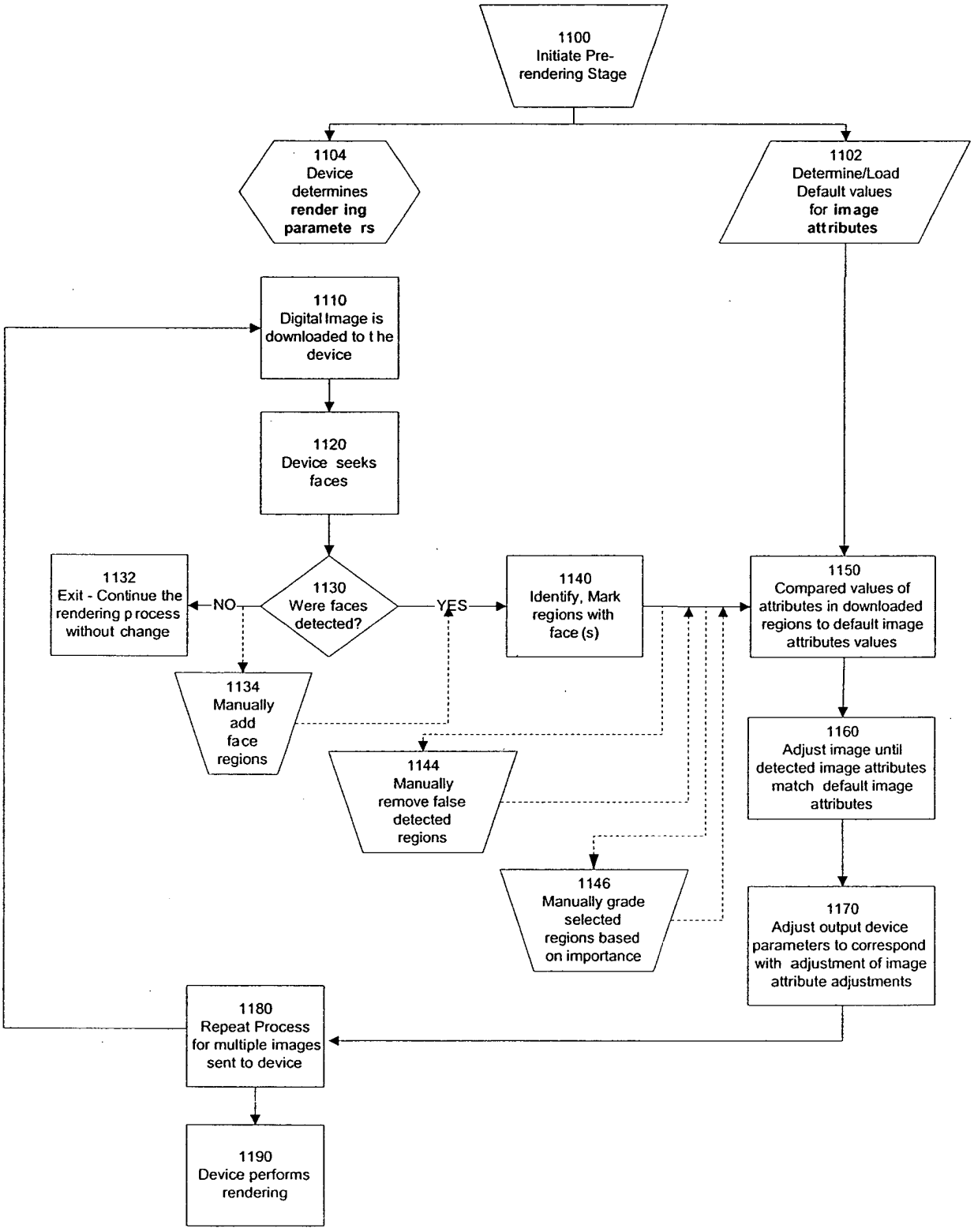

1100
Initiate Pre-rendering Stage
1104
Device determines render ing paramete rs
1102
Determine/Load Default values for image attributes
1110
Digital Image is downloaded to t he device
1120
Device seeks faces
1130
Were faces detected?
NO
YES
1132
Exit - Continue the rendering p rocess without change
1134
Manually add face regions
1140
Identify, Mark regions with face (s)
1144
Manually remove false detected regions
1146
Manually grade selected regions based on importance
1150
Compared values of attributes in downloaded regions to default image attributes values
1160
Adjust image until detected image attributes match default image attributes
1170
Adjust output device parameters to correspond with adjustment of image attribute adjustments
1180
Repeat Process for multiple images sent to device
1190
Device performs rendering

Figure 1c

Figure 2a

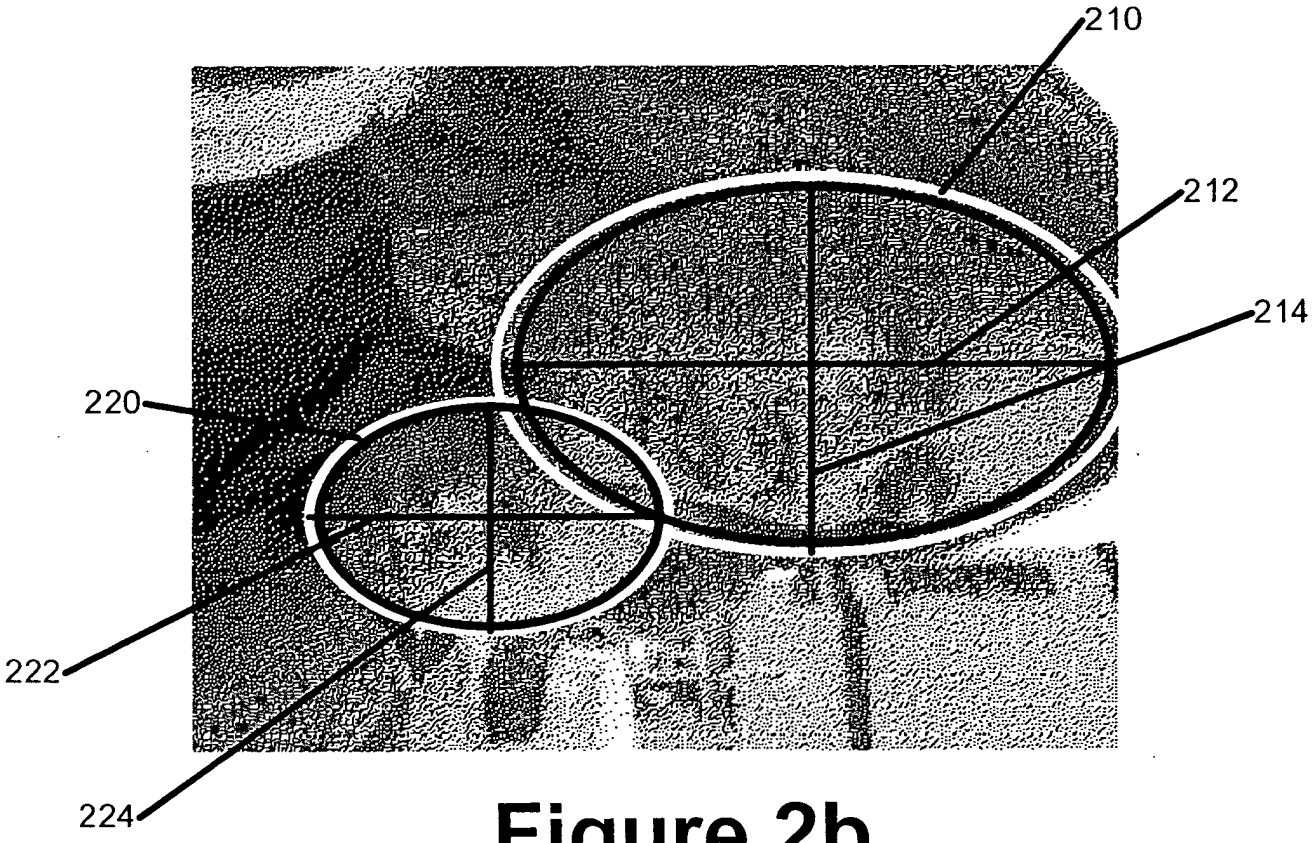


Figure 2b

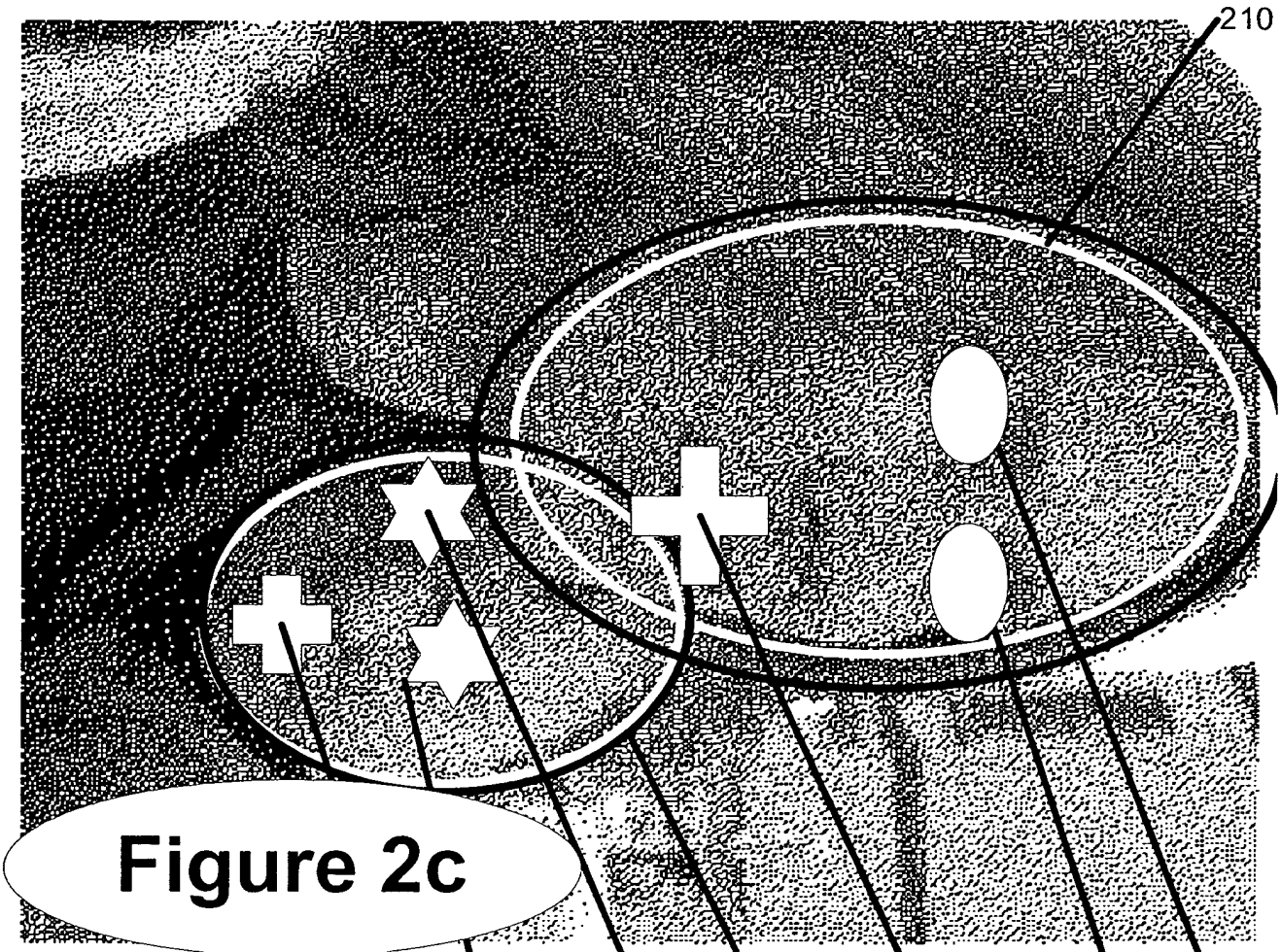


Figure 2c

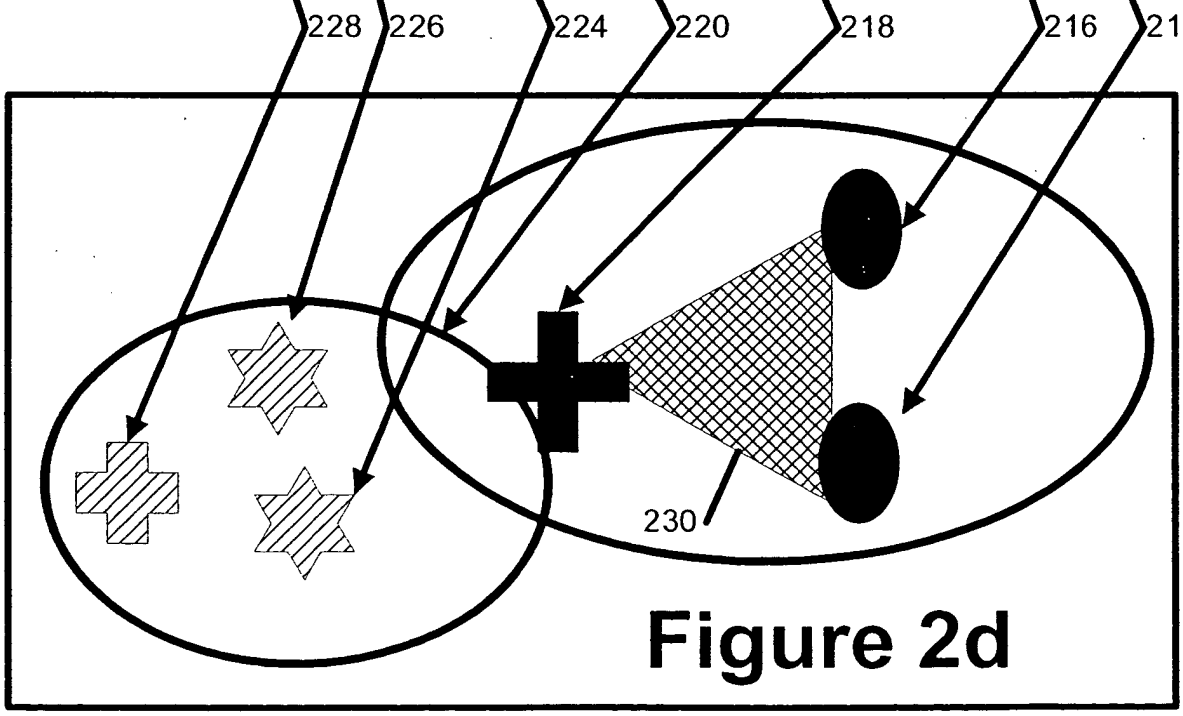


Figure 2d

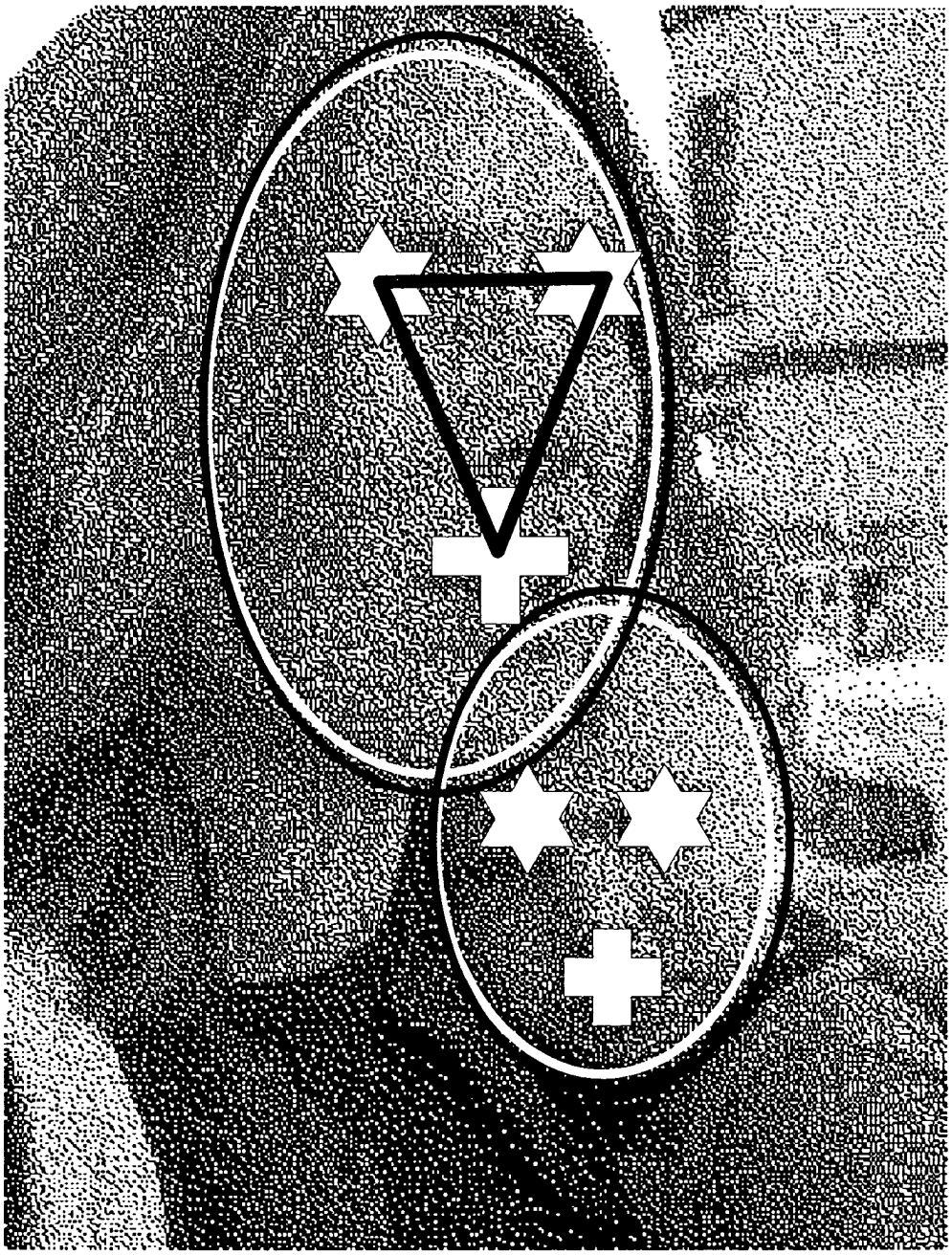


Figure 2e

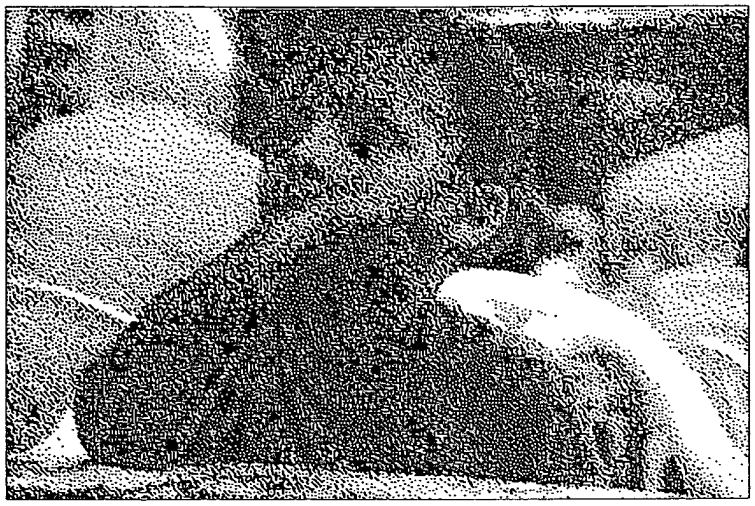


Figure 3a

Figure 3b

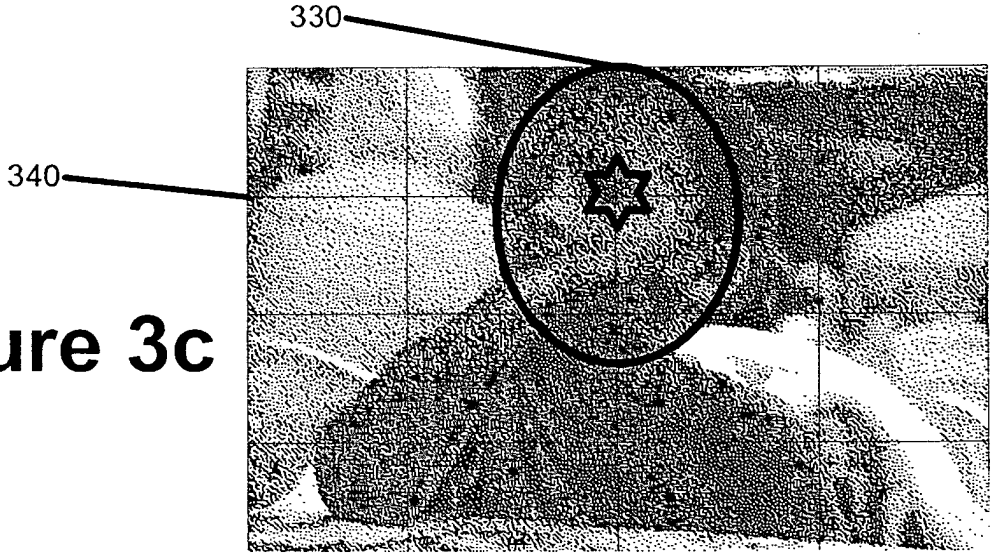


Figure 3c

Figure 3d

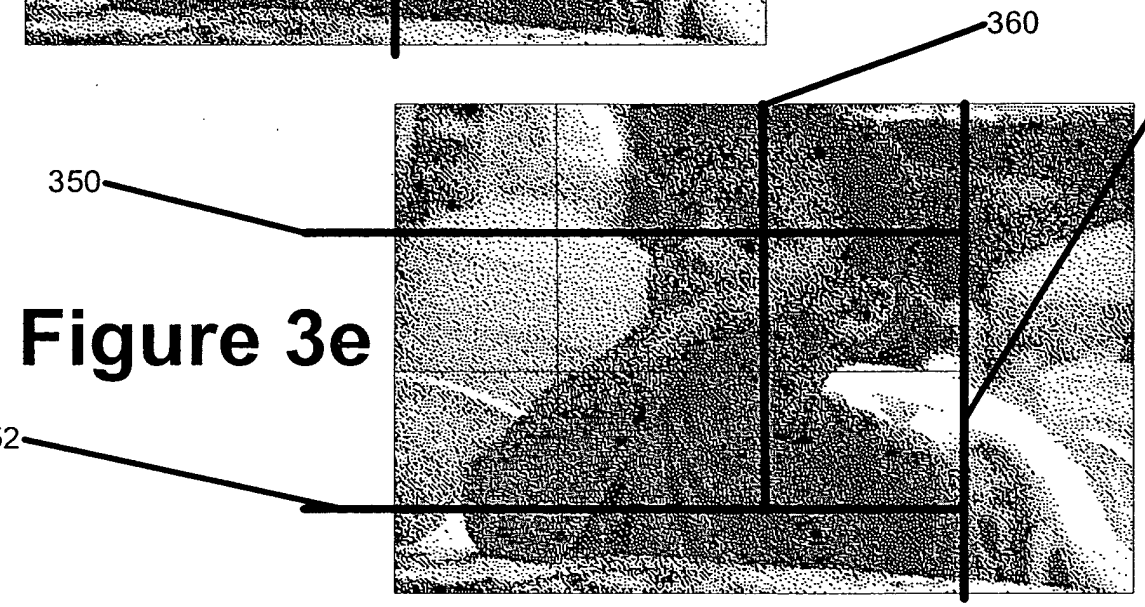


Figure 3e

Figure 3f

Figure 4a

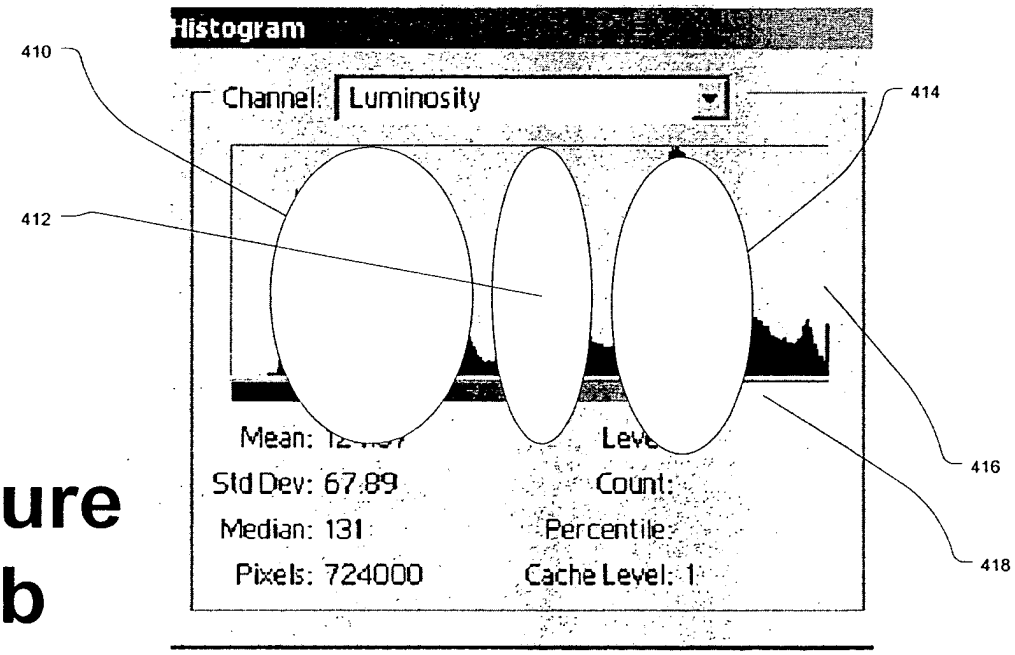


Figure 4b

Figure 4c

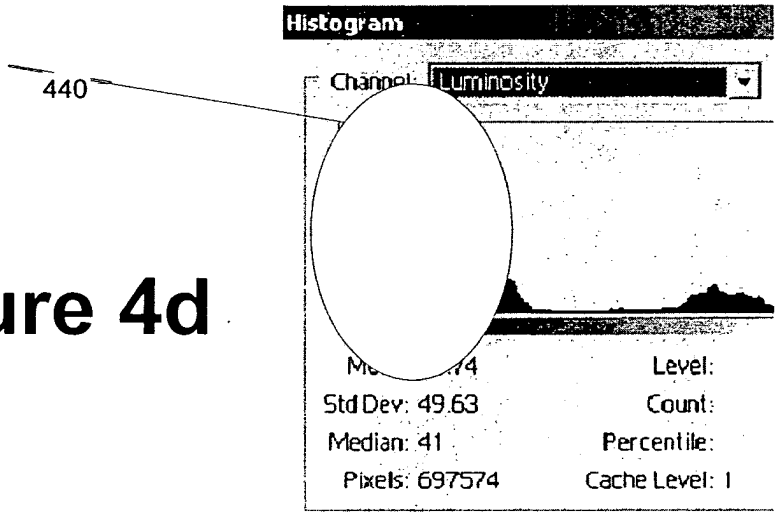


Figure 4d

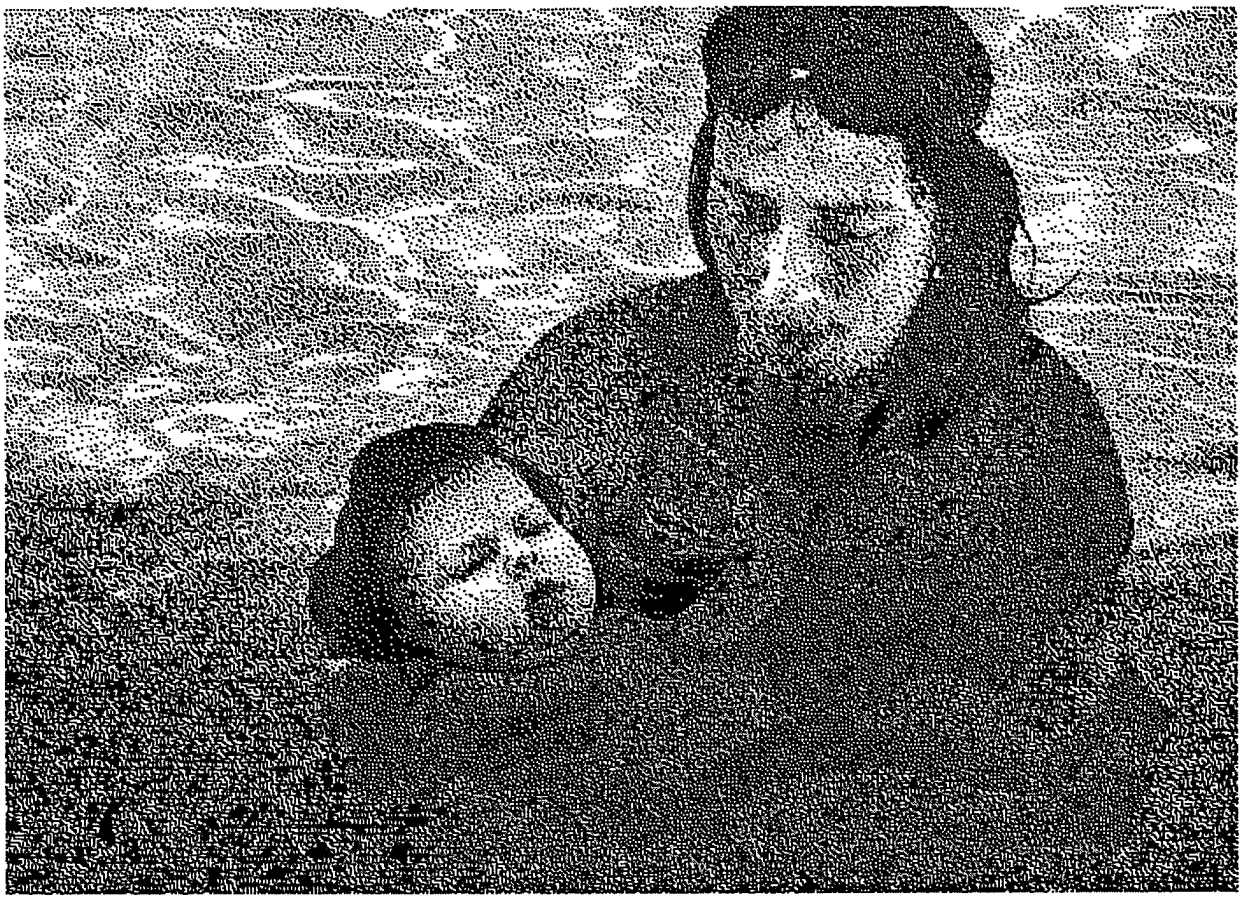
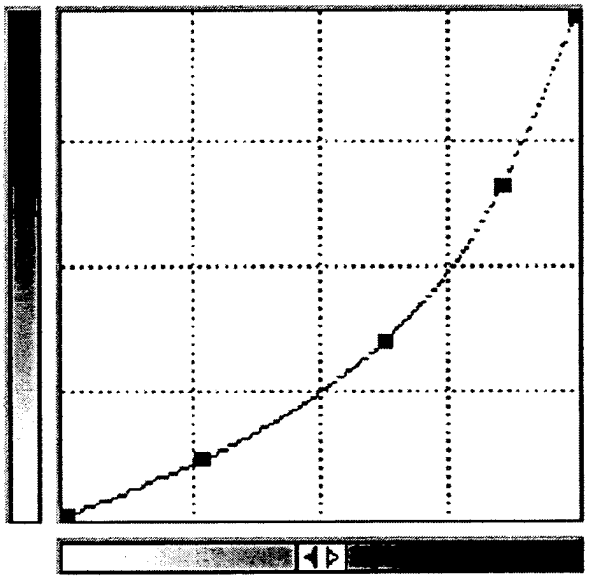


Figure 4e

Figure 4f



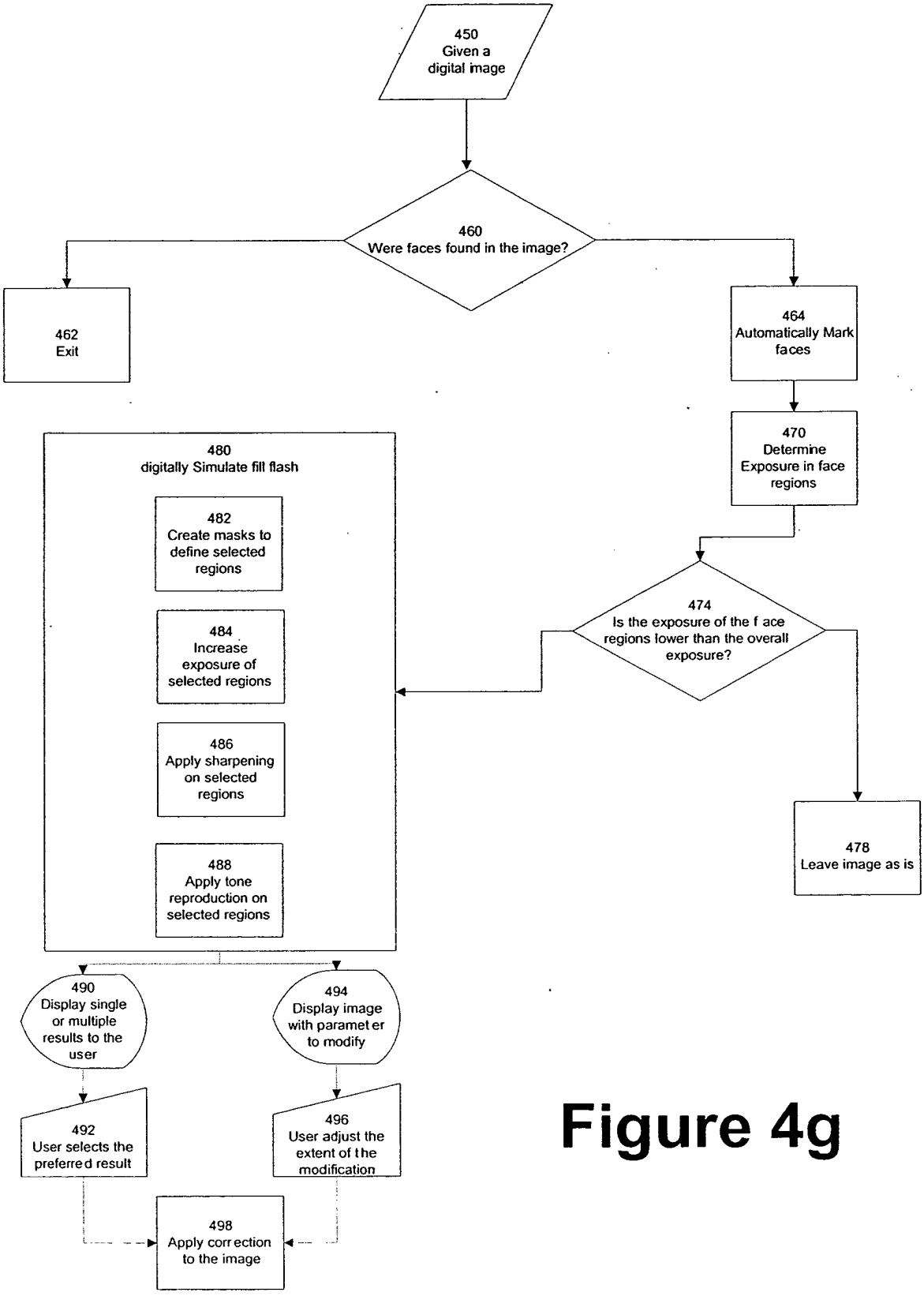

450
Given a digital image
460
Were faces found in the image?
462
Exit
464
Automatically Mark faces
470
Determine Exposure in face regions
474
Is the exposure of the f ace regions lower than the overall exposure?
478
Leave image as is
480
digitally Simulate fill flash
482
Create masks to define selected regions
484
Increase exposure of selected regions
486
Apply sharpening on selected regions
488
Apply tone reproduction on selected regions
490
Display single or multiple results to the user
492
User selects the preferred result
494
Display image with parameter to modify
496
User adjust the extent of the modification
498
Apply correction to the image

Figure 4g

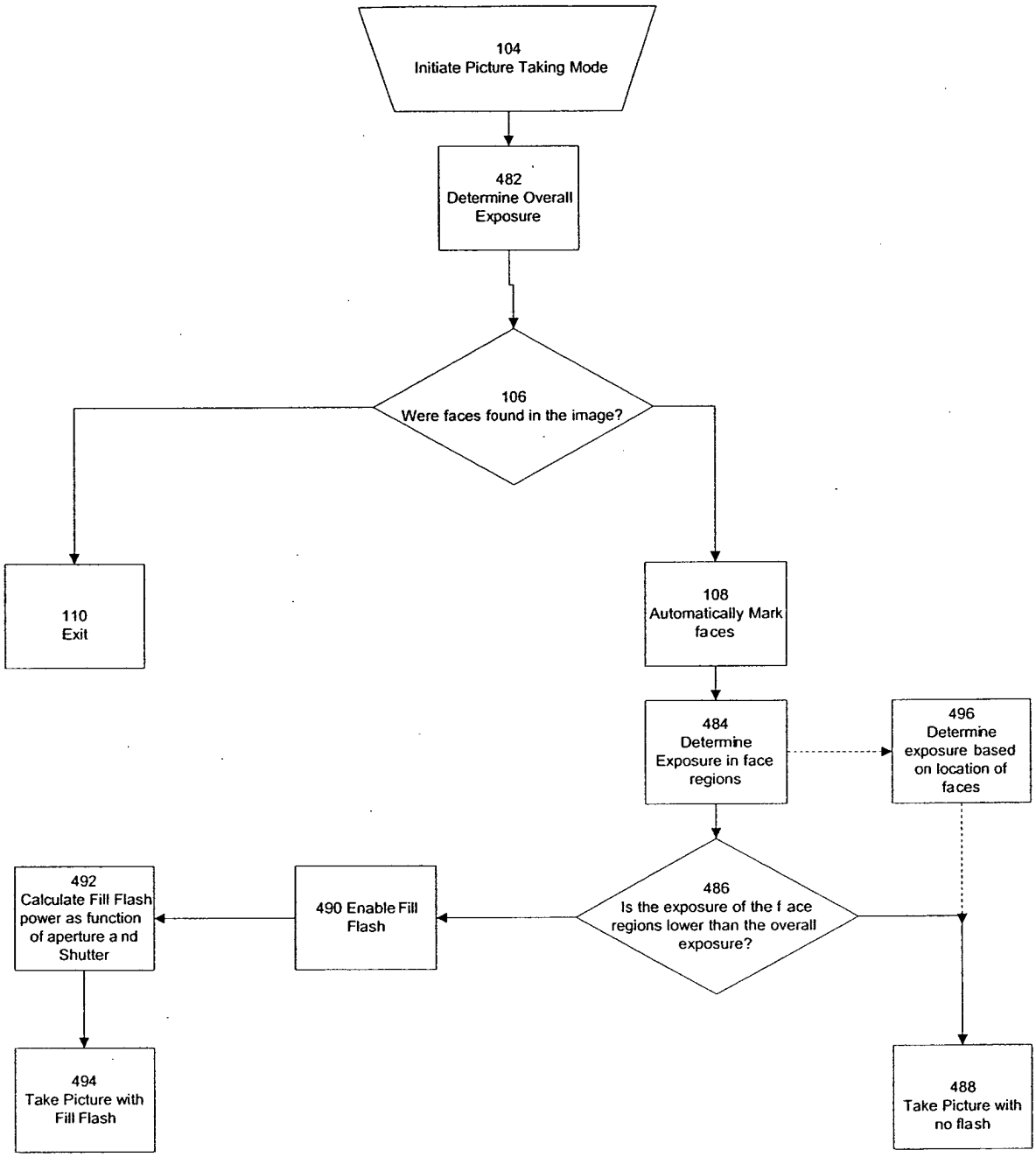

104
Initiate Picture Taking Mode
482
Determine Overall Exposure
106
Were faces found in the image?
110
Exit
108
Automatically Mark faces
484
Determine Exposure in face regions
496
Determine exposure based on location of faces
486
Is the exposure of the f ace regions lower than the overall exposure?
490 Enable Fill Flash
492
Calculate Fill Flash power as function of aperture a nd Shutter
494
Take Picture with Fill Flash
488
Take Picture with no flash

Figure 4h

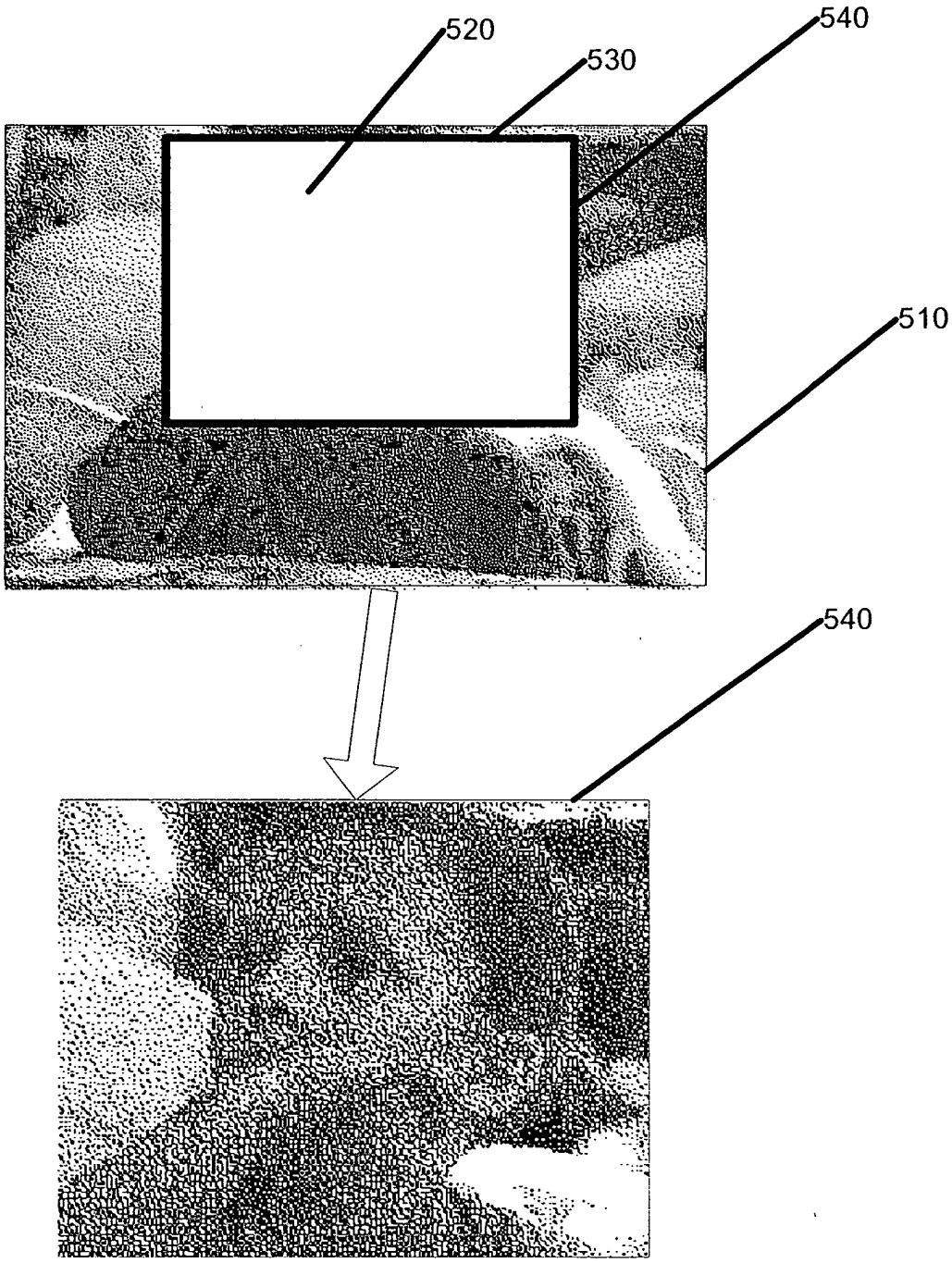


Figure 5

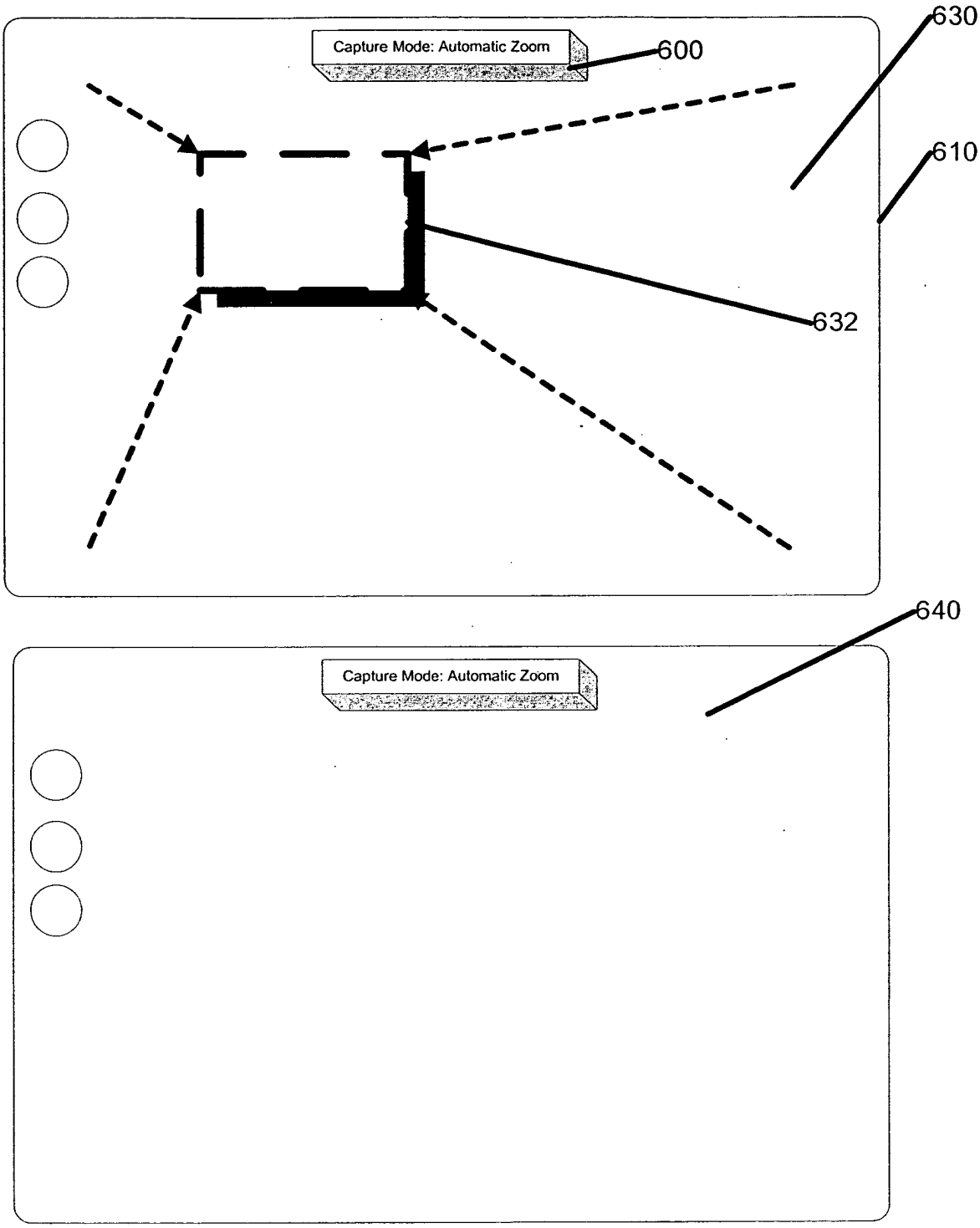

Capture Mode: Automatic Zoom
600
630
610
632
640
Capture Mode: Automatic Zoom

Figure 6

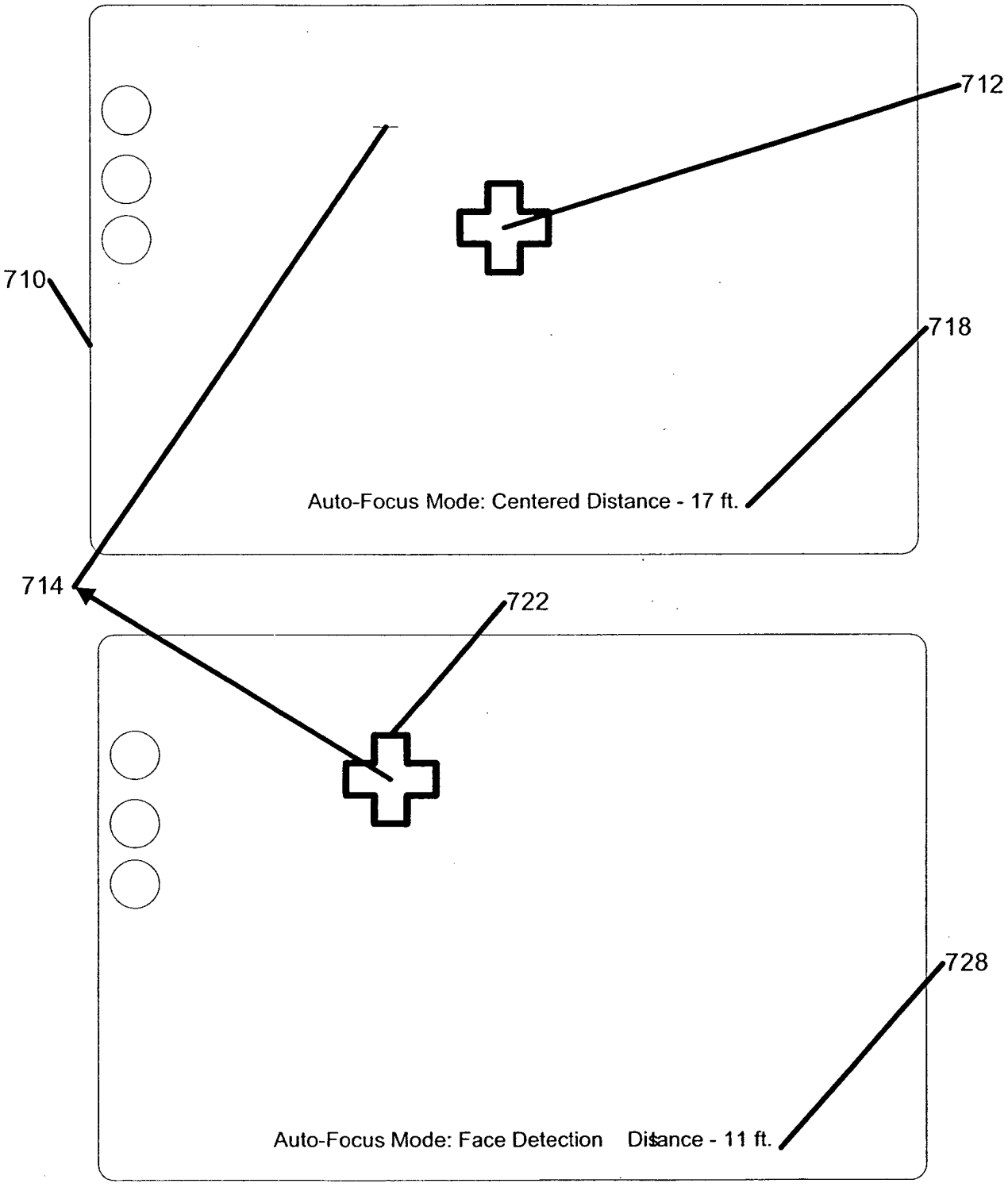

712
710
718
Auto-Focus Mode: Centered Distance - 17 ft.
714
722
728
Auto-Focus Mode: Face Detection Distance - 11 ft.

Figure 7a

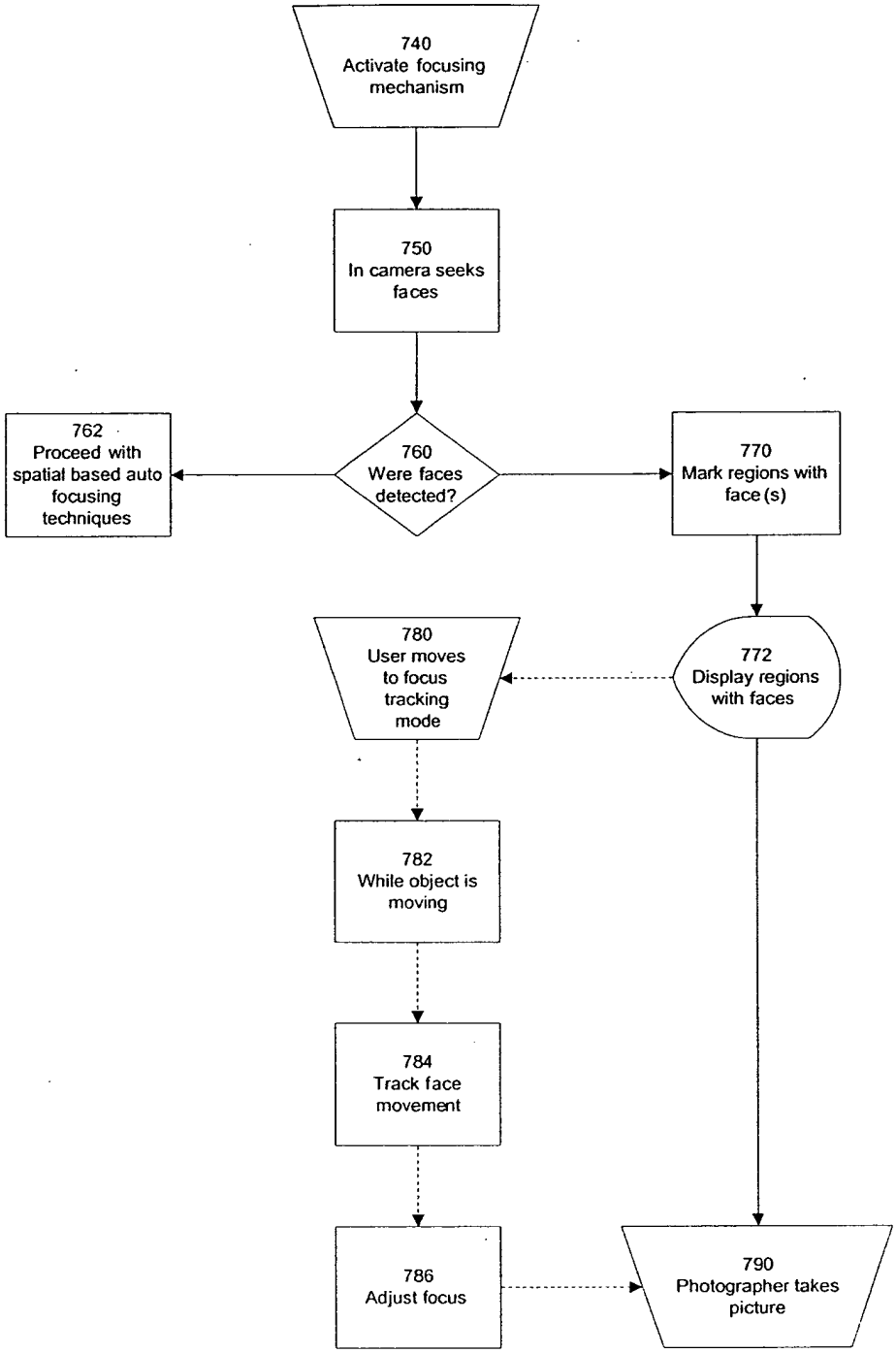

740
Activate focusing mechanism
750
In camera seeks faces
760
Were faces detected?
762
Proceed with spatial based auto focusing techniques
770
Mark regions with face(s)
772
Display regions with faces
780
User moves to focus tracking mode
782
While object is moving
784
Track face movement
786
Adjust focus
790
Photographer takes picture

Figure 7b

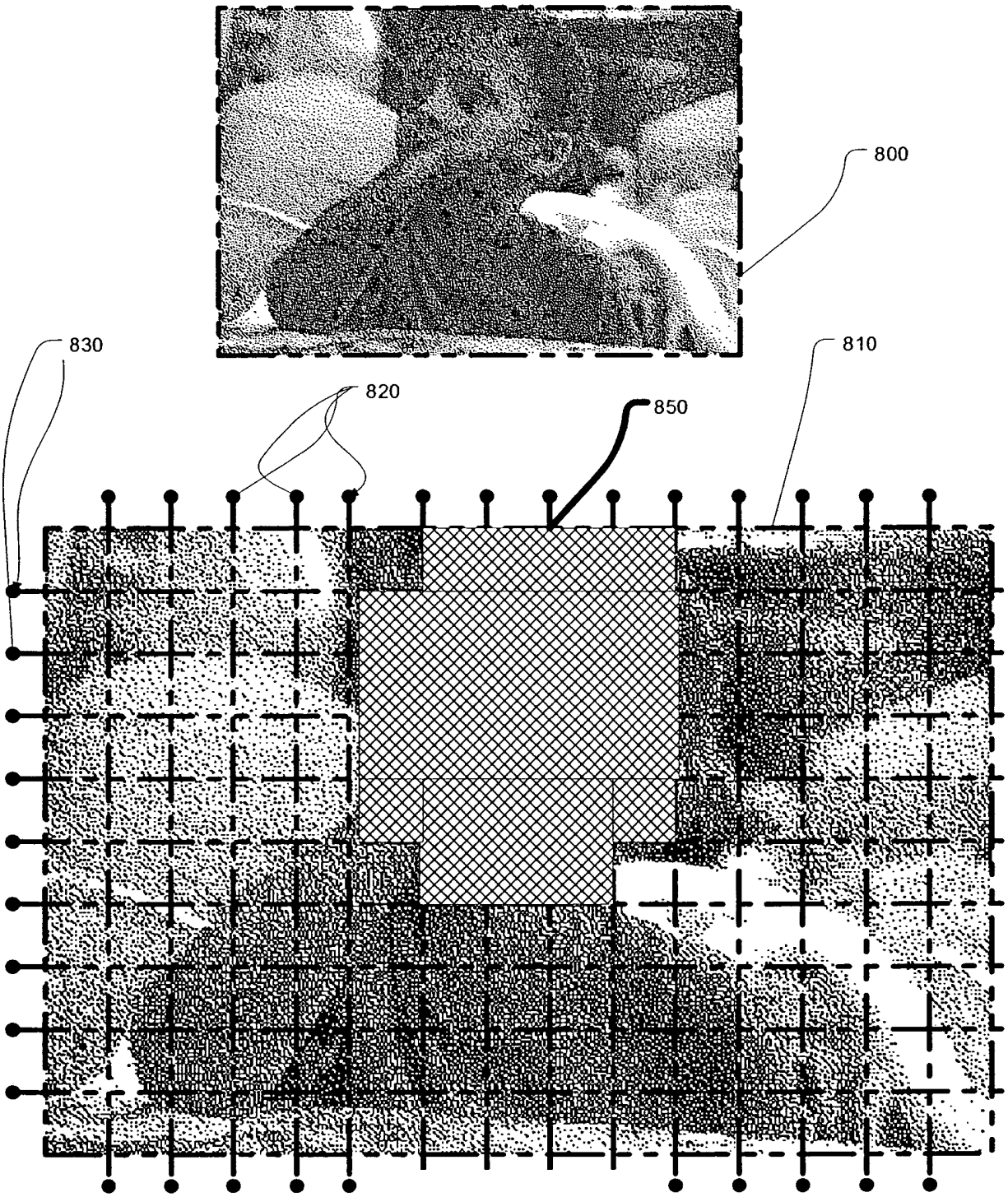


Figure 8